

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-01881a. REPORT SECURITY CLASSIFICATION
Unclassified

1b. RESTRICTIVE MARKINGS

AD-A199 991

(S)

3. DISTRIBUTION / AVAILABILITY OF REPORT

Approved for public release;
Distribution unlimited

5. MONITORING ORGANIZATION REPORT NUMBER(S)

AFOSR-TR- 88-1065

6a. NAME OF PERFORMING ORGANIZATION

Stanford University

6b. OFFICE SYMBOL
(if applicable)

7a. NAME OF MONITORING ORGANIZATION

AFOSR/NC

6c. ADDRESS (City, State, and ZIP Code)

Stanford CA 94305

7b. ADDRESS (City, State, and ZIP Code)

Bldg 410
Bolling AFB DC 20332-64488a. NAME OF FUNDING / SPONSORING
ORGANIZATION

AFOSR

8b. OFFICE SYMBOL
(if applicable)

NC

9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER

AFOSR-85-0096

8c. ADDRESS (City, State, and ZIP Code)

Bldg 410
Bolling AFB DC 20332-6448

10. SOURCE OF FUNDING NUMBERS

PROGRAM
ELEMENT NO.
61102FPROJECT
NO.
2917TASK
NO.
A2WORK UNIT
ACCESSION NO.

11. TITLE (Include Security Classification)

Spectroscopic and Light Scattering Instrumentation Proposal

12. PERSONAL AUTHOR(S)

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13a. TYPE OF REPORT

FINAL

13b. TIME COVERED

FROM _____ TO _____

14. DATE OF REPORT (Year, Month, Day)

15. PAGE COUNT

4

16. SUPPLEMENTARY NOTATION

17. COSATI CODES

FIELD	GROUP	SUB-GROUP

18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

The equipment purchased on this grant falls into three categories: The first consists of components for four apparatus systems used for the study of oscillatory reactions and the effects of external periodic perturbations on such reactions. The second category includes generally used instrumentation including a storage oscilloscope, a visible spectrometer, a thermostat bath, an analytical balance, a pH meter and strip chart recorder. The third category is computers and components including upgrading for laboratory computers on hand, computer networking hardware, computer data acquisition elements (both hardware and software) used in all the experiments as well as theoretical work, associated with the experiments. (mgm) ←

20. DISTRIBUTION / AVAILABILITY OF ABSTRACT

☐ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS

21. ABSTRACT SECURITY CLASSIFICATION

Unclassified

22a. NAME OF RESPONSIBLE INDIVIDUAL

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22b. TELEPHONE (Include Area Code)

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22c. OFFICE SYMBOL

NC

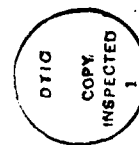
Title: Spectroscopic and Light Scattering Instrumentation Proposal

Inclusive Dates: January 1, 1985 - December 31, 1987

Contract Number: AFOSR-85-0096

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Accession For	
NTIS	GRA&I <input checked="" type="checkbox"/>
DTIC	TAB <input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	

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Submitted for Publication

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Abstract of Objectives and Accomplishments

The equipment purchased on this grant falls into three categories:

The first consists of components for four apparatus systems used for the study of oscillatory reactions and the effects of external periodic perturbations on such reactions. The components include peralstaltic pumps, flow meters, chart recorder, distillation unit, circulation water bath, spectrometer, flow meters. One apparatus has been used extensively for the study of the oscillatory combustion of acetaldehyde with oxygen in which we observed periodic and quasi periodic responses to external periodic perturbations. We also studied the imposition of two simultaneous periodic perturbations which leads to hysteresis and a variety of responses observed for the first time. In the second apparatus we have studied the response of a liquid phase reaction to external perturbations, have observed a super critical Hopf bifurcation and the generation of an attracting 2-torus from stable limit cycle. In the third apparatus we are studying the efficiency of the combustion of methane with steady and oscillatory input of reactants. In the forth apparatus we are studying chemical pumps and the thermodynamic efficiency. All these studies lead to enhanced determination of complex reaction mechanisms.

The second category includes generally used instrumentation including a storage oscilloscope, a visible spectrometer, a thermostat bath, an analytical balance, a ph meter and strip chart recorder used in the experiments described in the previous paragraph and, in addition, in the experiments on chemical waves and periodic precipitation processes. We have measured a variety of properties on kinematic waves, trigger waves

and phase waves including velocity front profile and dispersion relations. Extensive measurements have been made in periodic precipitation processes by means of absorption and reticon techniques, microscope observation and standard analytical methods in order to obtain the temporal developments of band formation, propagation of the precipitation front, spatial distribution of total precipitate, particle density and variation of average particle radius.

The third category is computers and components including upgrading for laboratory computers on hand, computer networking hardware, computer data acquisition elements (both hardware and software) used in all the experiments as well as theoretical work, associated with the experiments including the study of entrained (periodic) response to periodic perturbations of an oscillatory chemical system, colloidal growth, systems with multiple stationary and the subjects mentioned in the prior paragraphs.